

REMARKS

Claims 1, 2, 8, 9, 24, 25 and 27-30 are pending in this application. Claims 3-7, 10-23 and 26 are cancelled. By this Amendment, claims 1, 2, 8 and 9 are amended to address the rejections under 35 U.S.C. §112, second paragraph, and the rejections relying upon Katsuto and Makoto. Claims 24 and 25 are amended to address the provisional obviousness-type double patenting rejection over copending Application No. 10/807,278. New claims 27-30 are added.

No new matter is added by this Amendment. Claim 1 is amended to include limitations of prior claim 3 therein. Additionally, amendments to claim 1 are supported in the original specification, for example, on page 21, lines 4-6, describing that favorable hysteresis is obtained when the proportion of Nb does not exceed 40 mol%, meaning that the mol% of Nb as expressed in "x" may be less than or equal to 40%, or 0.4. Amendments to claim 2 are supported in the original specification, for example, on page 9, lines 16-22, describing a ferroelectric film having $(\text{Pb}_{1-y}\text{A}_y)(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ where y is within the range of $0 < y \leq 0.2$, an A element includes at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, and a B element includes at least one of Zr, Ti, V, W, Hf and Ta. The amendments to claims 8 and 9 are supported in the original specification, for example, on page 41, lines 17-18, describing that the additive that promotes crystallization could be a germanate (Ge) instead of a silicate, and on page 10, lines 1-2, describing the range of the additive. The amendments to claim 24 are supported in the original specification, for example, on page 35, line 14 to page 36, line 6, describing the method for manufacturing ferroelectric memory wherein the ferroelectric memory device includes a substrate, a transistor formed on the substrate and a ferroelectric capacitor formed above the substrate and wherein the ferroelectric capacitor comprises a ferroelectric film. The amendments to claim 25 are supported in the original specification, for example, on page 38, line 18 to page 39, line 12,

describing that a piezoelectric actuator includes a substrate, a piezoelectric element formed above the substrate and wherein the piezoelectric element includes a ferroelectric film.

I. Restriction

Applicants confirm the election of Group I, claims 1-13 and 24-26. Non-elected claims 14-23 are canceled.

II. Allowable Subject Matter

Applicants note with appreciation that claims 2 and 3 contain allowable subject matter.

III. Rejection under 35 U.S.C. §112

Claims 3, 8-13 and 24 were rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite. This rejection is respectfully traversed.

Claim 1 is amended to include limitations of prior claim 3 therein. The subscript "y" which defines a mol% range is no longer present in claim 1.

Claims 8 and 9, as amended, recite the ferroelectric film in a manner finding proper antecedent basis in claim 1.

Claim 24 is amended to recite the ferroelectric memory device with reference to the ferroelectric film of claim 1, rather than a method of claim 1.

For all the foregoing reasons, Applicants respectfully submit that the rejections under 35 U.S.C. §112, second paragraph are overcome. Reconsideration and withdrawal of the rejection are respectfully requested.

**III. Non-Statutory Double Patenting Rejection Over
Co-Pending Application No. 10/807,278**

Claims 24-26 were rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 5-7 of copending Application No. 10/807,278. This rejection is respectfully traversed.

Claim 24, as amended, recites a ferroelectric memory device that includes a substrate, a transistor formed on the substrate and a ferroelectric capacitor formed above the substrate and wherein the ferroelectric capacitor comprises a ferroelectric film as recited in claim 1, that is, a ferroelectric film described by a general formula $(\text{Pb,A})(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, wherein a B element comprises at least one of Zr, Ti, V, W, Hf and Ta, and wherein x is within the range of $0.05 \leq x \leq 0.4$.

Claim 25, as amended, recites a piezoelectric actuator that includes a substrate, a piezoelectric element formed above the substrate and wherein the piezoelectric element includes a ferroelectric film as recited in claim 1, that is a ferroelectric film described by a general formula $(\text{Pb,A})(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, wherein a B element comprises at least one of Zr, Ti, V, W, Hf and Ta, and wherein x is within the range of $0.05 \leq x \leq 0.4$. Claim 26 is cancelled.

Claim 5 of copending Application No. 10/807,278, on the other hand, recites a ferroelectric capacitor formed by a method of manufacturing a ferroelectric capacitor that includes, forming a lower electrode on a base, forming a ferroelectric film which includes a lead zirconate titanate niobate (PZTN) complex oxide including lead, zirconium, titanium, and niobium on the lower electrode, forming an upper electrode on the ferroelectric film forming a protective film so as to cover the lower electrode, the ferroelectric film, and the

upper electrode, and performing heat treatment for crystallizing the PZTN complex oxide at least after forming the protective film. Claim 6 of copending Application No. 10/807,278 recites a ferroelectric memory comprising the ferroelectric capacitor as defined in claim 5 of copending Application No. 10/807,278, and claim 7 of copending Application No. 10/807,278 recites a piezoelectric device comprising the ferroelectric capacitor as defined in claim 5 of copending Application No. 10/807,278.

Nowhere do claims 5-7 of copending Application No. 10/807,278 teach or suggest the ferroelectric film having a specific formula $(\text{Pb,A})(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, a B element comprises at least of Zr, Ti, V, W, Hf and Ta, and x is within the range of $0.05 \leq x \leq 0.4$ as recited in claim 1. Therefore, the claims of copending Application No. 10/807,278 would not have led one of ordinary skill in the art to claims 24-26.

Accordingly, reconsideration and withdrawal of this provisional obviousness-type double patenting rejection are respectfully requested.

IV. Rejections Under 35 U.S.C. §102(b)

A. Katsuto

Claims 1, 10, 12 and 24-26 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by JP 2001-080995 ("Katsuto"). This rejection is respectfully traversed.

Claim 1, as amended, recites a ferroelectric film that is described by a general formula $(\text{Pb,A})(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, a B element comprises at least of Zr, Ti, V, W, Hf and Ta, and x is within the range of $0.05 \leq x \leq 0.4$.

The Patent Office cited paragraph [0027] of Katsuto as allegedly supporting this rejection. Here, Katsuto teaches a ferroelectric film having a formula $\text{PbTi}_a\text{Zr}_b(\text{A}_g\text{B}_h)_c\text{O}_3$, where A expresses the trivalent metal chosen from the group which consists of a divalent

metal chosen from the group which consists of Mg, Co, Zn, Cd, Mn, and nickel, or Sb, Y, Fe, Sc, Yb, Lu, In and Cr and B expresses the pentavalent metal chosen from the group which consists of Nb, Ta, and Sb, or the metal chosen from the group which consists of W and Te. Katsuto teaches that Zr has a mol%, as expressed as b, in the range of $0.25 \leq b \leq 0.55$, meaning that Zr is present in a mol% in the range of 25% to 55%.

The relationship of Zr and Nb as recited in claim 1 is expressed as $B_{1-x}Nb_x$ and x is within the range of $0.05 \leq x \leq 0.4$, and thus Nb has a mol% in the range of from about 5% to about 40% while B, which may be Zr, has a mol% in the range of from about 60% to about 95%. Clearly, the mol% range of Zr in Katsuto is different from the mol% range of B (which may be Zr) as recited in claim 1.

Furthermore, nowhere does Katsuto teach or suggest a relationship between Zr and Nb expressed as $B_{1-x}Nb_x$ (if B is selected to be Zr) as recited in claim 1. In fact, Katsuto teaches a ferroelectric film in which the mol% of Zr is independent of the mol% of Nb. Thus, Katsuto does not teach or suggest the ferroelectric film having a specific formula $(Pb,A)(B_{1-x}Nb_x)O_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, a B element comprises at least of Zr, Ti, V, W, Hf and Ta, and x is within the range of $0.05 \leq x \leq 0.4$ as recited in claim 1. Therefore, the ferroelectric film as recited in claim 1 distinguishes over Katsuto.

The rejection of claims 10 and 12 under 35 U.S.C. §102(b) as allegedly being anticipated by Katsuto is moot in light of the cancellation of claims 10 and 12.

Claims 24 and 25 depend from claim 1. Because the ferroelectric film as recited in claim 1 distinguishes over Katsuto, claims 24 and 25 also distinguish over Katsuto.

For all the foregoing reasons, Applicants respectfully submit that Katsuto fails to anticipate the subject matter of claim 1, and claims dependent therefrom. Reconsideration and withdrawal of this rejection are respectfully requested.

B. Makoto

Claims 1, 4-6, 10, 13 and 25 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by JP 04-037076 ("Makoto"). This rejection is respectfully traversed.

Makoto teaches a ferroelectric film having a formula $\text{Pb}(\text{Zr}_x\text{Ti}_y(\text{Nb}_a\text{Sb}_b\text{Mn}_c)_z)\text{O}_3$, wherein $a = 1$ and z is between 0.08 and 0.1. Nowhere does Makoto teach or suggest a relationship of Zr and Nb expressed as $\text{B}_{1-x}\text{Nb}_x$ as recited in claim 1. Furthermore, nowhere does Makoto teach or suggest the ferroelectric film having a specific formula $(\text{Pb},\text{A})(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, a B element comprises at least of Zr, Ti, V, W, Hf and Ta, and x is within the range of $0.05 \leq x \leq 0.4$ as recited in claim 1. Therefore, the ferroelectric film as recited in claim 1 distinguishes over Makoto.

The rejection of claims 4-6, 10 and 13 under 35 U.S.C. §102(b) as allegedly being anticipated by Makoto is moot in light of the cancellation of claims 4-6, 10 and 13.

Claim 25 depends from claim 1. Because claim 1 distinguishes over Makoto, claim 25 also distinguishes over Makoto.

For all the foregoing reasons, Applicants respectfully submit that Makoto fails to anticipate the subject matter of claim 1, and claims dependent therefrom. Reconsideration and withdrawal of this rejection are respectfully requested.

C. Ryu

Claims 10-11 were rejected under 35 U.S.C. §102(b) as allegedly being by anticipated by Ryu et al., J. Am. Ceram. Soc. 84, pages 902-904 (2001) ("Ryu"). This rejection is respectfully traversed. Claims 10-11 are cancelled and thus the above rejection is moot.

For all the foregoing reasons, Applicants respectfully submit that Ryu fails to anticipate the subject matter of claims 10-11. Reconsideration and withdrawal of this rejection are respectfully requested.

V. Rejection Under 35 U.S.C. §103(a)

Claims 7-9 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Makoto as applied to claims 1 and 4-6 above, and further in view of U.S. Patent No. 5,279,996 ("Hase"). This rejection is respectfully traversed.

Makoto does not teach or suggest the ferroelectric film having a crystal structure as recited in claim 7 and does not teach or suggest the ferroelectric film comprising Si, Ge or Si and Ge as recited in claims 8-9. In addition, as discussed above, Makoto fails to describe or suggest the ferroelectric film as recited in claim 1. Thus, even if Hase were to have been combined with Makoto as alleged by the Patent Office, present claim 1 still would not have been achieved because Hase does not remedy the deficiencies of Makoto. Specifically, Hase also does not teach or suggest the ferroelectric film having a specific formula $(\text{Pb,A})(\text{B}_{1-x}\text{Nb}_x)\text{O}_3$ wherein an A element comprises at least one of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu, a B element comprises at least of Zr, Ti, V, W, Hf and Ta, and x is within the range of $0.05 \leq x \leq 0.4$ as recited in claim 1.

For the foregoing reasons, Applicants respectfully submit that Makoto and Hase, alone or in combination, would not have led one of ordinary skill in the art to claims 7-9. Reconsideration and withdrawal of this rejection are respectfully requested.

VI. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 2, 8, 9, 24, 25, and 27-30 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Andrew M. Chow
Registration No. 51,559

JAO:AMC/rav

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OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

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